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ABSTRACT

Using between subject designs, Tversky and Sherman (1975) and Weaver (1974) demonstrated that increases in the blank interval (offtime) separating two successive pictures leads to improved performance on retention tests. If this improvement results from active rehearsal strategies, subjects should be able to differentially rehearse pictures cued as more valuable, and this differential rehearsal should be more effective with longer off-times. This question was investigated in a 2 x 2 design where a tone at offset was used to cue valuable pictures (within subjects) at two ISI values (across subjects). The main effects of both off-time and tone were significant, but there was no tone X off-time interaction. These results do not support the active rehearsal hypothesis. Alternative hypotheses are discussed. (Author)

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The Role of Active Rehearsal in the Memory for Complex Pictures

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Introduction

The present study is concerned with the possible role of rehearsal in memory for complex pictures.

Under some circumstances, increasing the blank interval, or "off-time", following the presentation of a picture seems to enhance performance on a subsequent retention test, suggesting perhaps that the encoding of a complex picture continues after its presentation has been terminated.

Tversky and Sherman (1975) found improvement on both recall and recognition with increases in the blank interval separating successive pictures. Their data are consistent with results reported earlier by Weaver (1974) for recognition tasks. These studies mixed exposure durations, or "on-times", within a block, but held off-time constant for each group of subjects. Indeed, blocking by off-time appears to be critical, and the failure of Shaffer and Shriffrin (1972) to find an improvement in memory with increasing off-time is attributed to their mixing off-time conditions within a block.

Why do variations in off-time have an effect on picture memory only when they are blocked? Weaver (1974) suggested that blocking allows subjects to adopt consistent post-stimulus processing strategies. One obvious strategy which is consistent with the above results is active rehearsal--where active connotes a voluntary process. With this experiment we sought to determine whether active rehearsal, and more generally voluntary processes, underlie the effect of off-times on performance.

If this improvement results from active rehearsal strategies, subjects should be able to differentially rehearse pictures cued as more valuable; and this differential rehearsal should be more effective the longer is the off-time. We used a tone <u>at offset</u> to cue the more valuable

pictures and two (2) levels of off-time durations. This yields the four conditions shown in Table 1 of the handout. In this 2 x 2 design, the presence or absence of the tone varied within subjects, the two levels of off-time across subjects. On-time duration was held constant. The outcome of interest for the active rehearsal hypothesis is the tone x off-time interaction.

Method

Subjects saw 80 vacation slides, each exposed for 2.2 seconds. For 50 subjects the ISI (off-time) was always 0.8 secs. (short condition); for another 50 subjects the ISI was 3.8 secs. (long condition). The presentation series was composed of 20 filler slides at the beginning and end of the sequence, and 60 target slides. Half the pictures (30 target and 10 filler), selected randomly, were paired with a 300 msec., 1430 Hz. tone which coincided with the offset of the picture. The only difference between the long and short conditions was that in the short condition, every slide frame contained a picture, while in the long condition every other slide frame was blank, producing a 3.8 sec. ISI.

Subjects were tested in groups of 10-13. They were told that, in addition to class credit, they would be paid for each slide correctly remembered, and that pictures paired with tones were much more valuable than the others. They were not told the relative values of tone/no-tone pictures, and were given no information about the nature of the retention test.

The slides were rotated through the tone condition so that for half the subjects in each off-time condition a particular picture was paired with a tone, for the other half it occurred without a tone. The recognition memory test was a 2-alternative forced choice task, on which the

subjects had to discriminate a target slide from its simultaneously presented mirror image. Subjects chose the "left" or "right" picture by blackening the appropriate box on an IBM test form. They were given 8 secs. for each judgment.

Results

Table 2 shows the mean number of pictures recognized, out of a possible 30, in each condition, the standard deviation, and percent correct. Figure 1 displays this graphically. The main effects of off-time ($F=31.47$, $df=1,100$, $p < .001$) and tone ($F=12.18$, $df=1,100$, $p < .001$) were statistically significant, but the tone x off-time interaction was not.

Discussion

The failure to find an interaction of tone and off-time casts doubt on the active rehearsal hypothesis. Percent correct scores are not high enough to account for this failure in terms of ceiling effects. If blocking by off-time results in the adoption of different post-stimulus processing strategies within different blocks, the results suggest that these strategies are not under the subject's control.

The effects of off-time found here are consistent with those reported by Tversky and Sherman (1975) and Weaver (1974). It is not clear why the tone resulted in superior performance, but the effect of the tone is apparently independent of off-time variations.

If voluntary post-stimulus strategies are unlikely, how is the pattern of off-time effects to be interpreted? It is important to note that in experiments where off-time is blocked, it is completely confounded with presentation rate. The results to date are consistent with a number of hypotheses all of which predict that the rate of occurrence of prior items will affect the degree of encoding of the current item. Levine, Pettit,

and Lockart (1973) for example, have suggested that rate of presentation may be important in maintaining an optimum level of arousal in some neural or attentional mechanism. The faster the presentation rate, the less attention must be given to the current item to maintain this optimal level of arousal. Thus, off-times of prior items may affect performance by altering the subject's capacity to attend to or encode the picture while it is present.

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Footnotes

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	Off Time: Short	Off Time: Long
Tone	ST: 30 pict. ISI= .8sec	LT: 30 pict. ISI=3.8 secs
No Tone	SN-T: 30 pict. ISI= .8secs	LN-T: 30 pict. ISI= 3.8sec

TABLE 1: Shows the 4 different conditions, the ISI, and the number of target pictures in each. The study was blocked by off time as indicated by the double line.

	Off Time: Short			Off Time: Long		
	Mean	SD	%Cor	Mean	SD	%Cor
Tone	22.35	3.44	75	25.37	2.63	85
No Tone	21.31	3.51	71	24.37	2.99	81

TABLE 2: Shows the mean, SD, and percent correct for each condition.

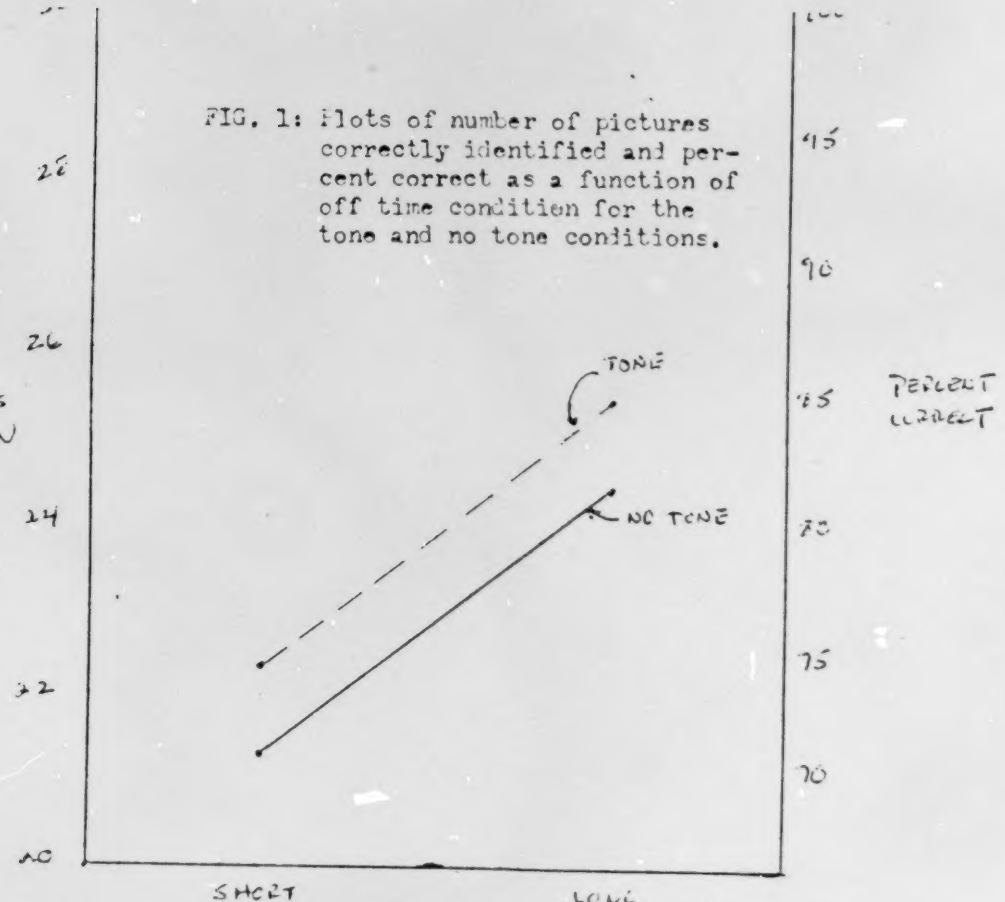

FIG. 1: Plots of number of pictures correctly identified and percent correct as a function of off time condition for the tone and no tone conditions.